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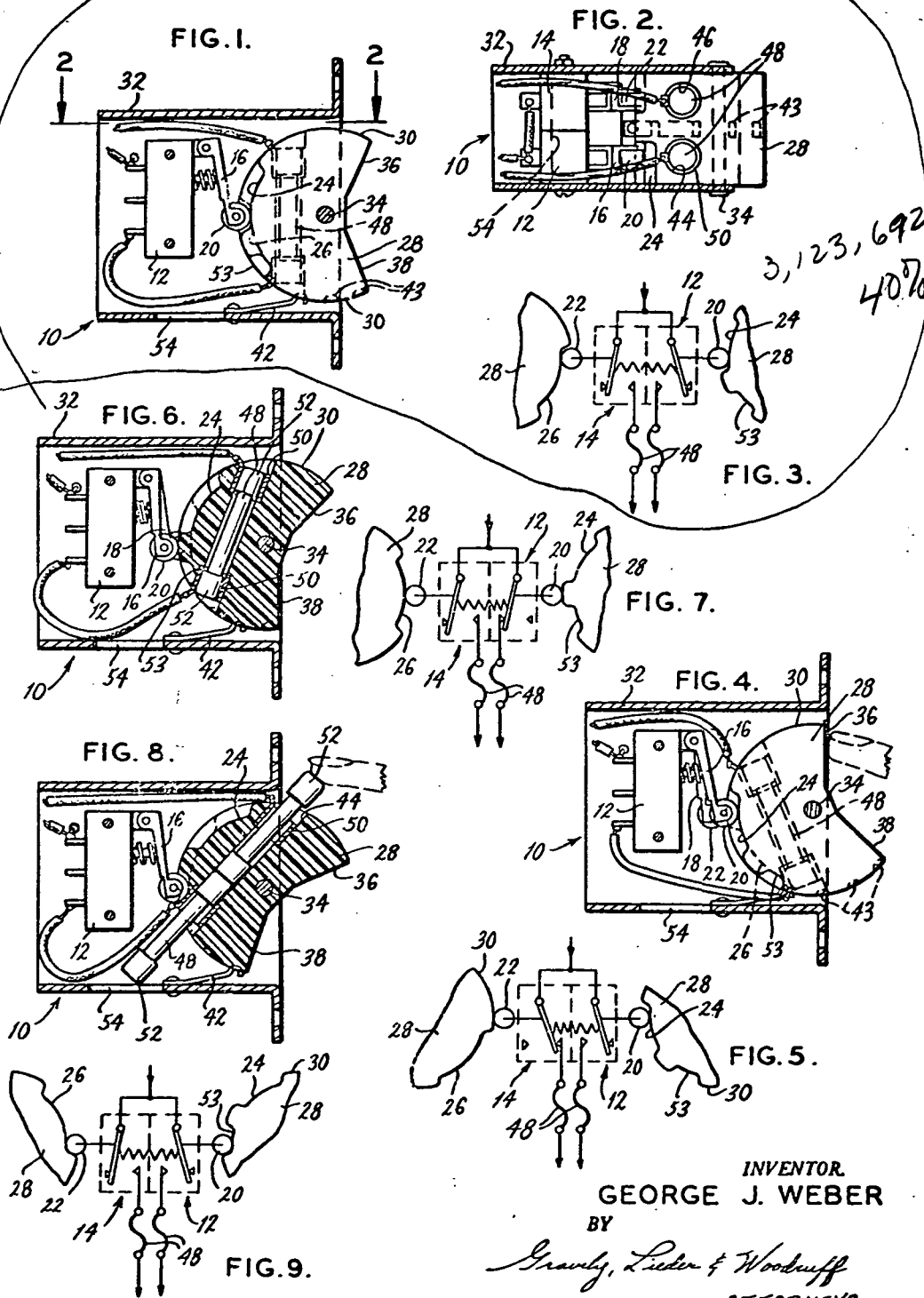
FUSED SWITCH

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FUSED SWITCH

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The present invention relates generally to switches and more particularly to a fused switch construction.

Many different kinds of switches and related devices are known in the art, and some of the known devices are used in conjunction with fuses and circuit breakers. So far as is known, however, no one heretofore has devised a fused switch device which is designed to be safe to operate even in a highly explosive atmosphere where a spark hazard would be potentially dangerous. Furthermore, so far as known no one heretofore has devised a push type switch with an operator member that has built in fuse means, and in which installation and replacement of fuses is greatly simplified.

It is therefore a principal object of the present invention to provide a fused switch device constructed to be safely used even in an explosive atmosphere.

Another object is to provide a compact, light weight and relatively inexpensive fused switch device.

Another object is to reduce the spark hazard of switches and fuse devices.

Another object is to combine switch means and fuse means in a simple compact, light weight structure.

Another object is to simplify installation and removal of fuses even with restricted visibility of the servicing personnel.

Another object is to provide a rugged fused switch device capable of withstanding relatively severe shock and vibration, and which is not adversely affected by extremes of temperature.

Another object is to provide a push button type switch with built in fuse means.

Still another object is to provide a push operated switch having multiple operating positions.

Briefly, the present invention comprises a switch having an operating arm, movable actuator means engageable with said arm and movable between a plurality of positions in which said arm opens or closes the switch, and fuse means carried by the actuator means, said fuse means including a passage through said actuator means and a fuse slidably positioned in said passage, said fuse being replaceable in said passage by another fuse when said actuator means is in a particular one of its plurality of positions.

These and other objects and advantages of the present invention will become apparent after considering the following detailed specification in conjunction with the accompanying drawing, wherein:

FIG. 1 is a side-elevation view, partly in section, of a switch device constructed according to the present invention, the device being shown in inoperative position;

FIG. 2 is a cross-sectional view taken on line 2-2 of FIG. 1;

FIG. 3 is a schematic wiring diagram of a typical circuit for the switch device of FIGS. 1 and 2;

FIG. 4 is a view similar to FIG. 1 showing the device in one of its operated positions;

FIG. 5 is a schematic wiring diagram corresponding to the operated position of the switch shown in FIG. 4;

FIG. 6 is another view similar to FIG. 1, showing a different operated position of the device, the operator member being also shown in cross-section;

FIG. 7 is the corresponding schematic wiring diagram for the switch position shown in FIG. 6;

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FIG. 8 is a view similar to FIG. 6 showing still another operated position of the device; and

FIG. 9 is the schematic wiring diagram corresponding to the switch position of FIG. 8.

Referring to the drawing by reference numbers, the number 10 refers to a switch device constructed according to the present invention. The device 10 is shown for illustrative purposes having a pair of switches, such as low travel limit switches 12 and 14, and each switch is preferably a hermetically sealed unit. Each switch has an operator arm 16 and 18 respectively which carries a roller such as the rollers 20 and 22 respectively. The rollers are biased by means on the switches into engagement with cam surfaces 24 and 26 respectively on an operator member 28.

The operator member 28 has a rounded outer surface 30 with the cam surfaces 24 and 26 formed therein, and the cam surface 24 is cooperatively engaged by the roller 20, and the cam surface 26 by the roller 22.

In FIG. 1 the operator member 28 is shown in its inoperative or neutral position with both of the rollers 20 and 22 engaged respectively with their associated cam surfaces 24 and 26. In this position both of the switches 12 and 14 are unactuated as shown in the corresponding circuit wiring diagram of FIG. 3. In the structure shown, normally open switches are employed although it is obvious that normally closed switches could also be used without changing the nature of the invention.

The switches 12 and 14 and the operator member 28 are all mounted on a bracket member or housing 32 which can be constructed having any suitable size and shape depending on where it is to be installed. The operator member 28 is rotatably mounted on the bracket 32 by a shaft 34, and one side of the operator member 28 adjacent the open side of the bracket 32 is defined by a pair of spaced and substantially oppositely facing surfaces 36 and 38. The surfaces 36 and 38 are selectively pressed by the thumb or finger to operate the device by rotating the member 28.

It is also contemplated to provide means, such as the member 42, which resiliently engages the rounded surface 30 of the operator member 28 and retains the member 28 in its several operating positions.

The member 28 also has two spaced cross bores 44 and 46, one corresponding with each of the switches 12 and 14, which receive cylindrical hermetically sealed cartridge fuses 48. The ends of the bores 44 and 46 are provided with resilient contact members 50 which grip the fuses and make electrical contact with the ends 52 thereof. The contact members 50 are also provided with means for soldering wires onto for completing a circuit for the device. In FIG. 3 a typical circuit for the device is shown which corresponds to the position of the operator member 28 in FIG. 1, the two switches 12 and 14 being shown open.

In FIG. 4 the upper surface 36 has been depressed to a position moving the switch roller 22 outwardly onto the rounded surface 30 of the operator member 28 thereby closing the switch 14 (FIG. 5) while the roller 20 of switch 12 continues to be in contact with its associated cam surface 24 and the switch 12 remains open. The friction of the member 42 on the operator 28 retains the switch in the new setting position and notches or detents such as detents 43 may be provided therefor, if desired.

In FIG. 6 the operator member 28 is shown in the reverse condition from FIG. 4 wherein switch 12 is closed and switch 14 is open. This is illustrated in the circuit diagram of FIG. 7.

In FIG. 8 the surface 38 of the member 28 is shown pushed still further than in FIG. 6. In this position the switches 12 and 14 are again both open (FIG. 9) because

of an additional cam surface or depression 53 which is in line with the cam surface 26. When the rollers 20 and 22 are in contact with the depression 53 and 26 respectively both switches 12 and 14 are open and the ends of the fuse passages 44 and 46 are unobstructed so that new fuses can be installed and old ones ejected. Replacement of a fuse 48 is illustrated in FIG. 8. In this position the replacement fuses are installed by pushing them against the ends of the old fuses whereby the old fuses slide out of their holes. A suitable opening 54 is provided in the bracket 32 for the old fuses to fall through. Note in the construction shown and described herein that with both switches open (FIGS. 8 and 9) the fuses are dead and therefore can be replaced safely without danger of spark, or electrical shock hazards.

The particular embodiment and circuit shown and described herein is presented for illustrative purposes only. Obviously many changes can be made as in the shapes and in the number of parts. For example, the number of switches and fuses can be increased or decreased and the size and shape of the operator member correspondingly adjusted. Also normally open as well as normally closed switches can be used or even a combination of normally open and normally closed switches could be used. Still further the switches could be constructed having a greater number of transfer contacts and the cam surfaces could be formed to have different numbers of surface levels.

Thus there has been shown and described a novel fused switch device which fulfills all of the objects and advantages sought therefor. Many changes, modifications and variations of the device as illustrated by the preferred embodiment shown and described herein will become apparent to those skilled in the art after considering the specification and the accompanying drawing. All such changes, modifications and variations which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

What is claimed is:

1. An electrical switch device comprising a pair of switch units each having an operator arm movable between positions opening and closing the switch units, a rotatable operator member mounted adjacent to said switches and having a contoured surface associated with and engageable by each of said arms, means for rotating the operator member in a selected direction to change the positional engagement of said arms on the associated contour surfaces and thereby operate the switch units, a pair of spaced open-ended passages extending through said operator member, said switch units and said operator member are mounted on a housing having means

blocking at least one end of each of said open-ended fuse passages in certain selected positions of the operator member, said housing having other means unobstructing said passage ends in another position thereof, said last named position occurring when the switch units are open, sealed fuses slidably positioned in said passages, and means for electrically connecting said fuses in circuit with the switches.

2. A switch device comprising a bracket, sealed switch means mounted on said bracket, a movable arm for operating said switch means, an operator member mounted on said bracket for cooperating with said arm, said operator member having a cam surface resiliently engaged by said arm, a pair of opposed surfaces on said operator member adapted to be selectively pressed to move the operator member to a plurality of preselected positions for opening or closing the switch means, a passage through the operator member, a fuse element slidable into said passage, said passage having open ends which are unblocked in a particular preselected position of the operator member, said position occurring when the switch is open, and means for obstructing at least one end of said passage in all other positions of the operator member.

3. A switch device comprising a pair of limit switches each having an operator arm, an operator member mounted adjacent to said switches and having a different cam surface resiliently engaged by each of said switch arms, means for moving the operator member between a plurality of positions to change the positional engagement of said arms on said cam surfaces to operate the switches, an open-ended passage extending through said operator member, a fuse positioned in said passage, means preventing removal of the fuse from the passage in certain selected positions of the operator member, other means associated with a particular selected position of the operator member enabling the fuse to be removed from the passage, said particular position of the operator member occurring when the switch arms are engaged with the cam surfaces in a condition to open the associated switches.

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